



## First report of '*Candidatus* Phytoplasma asteris' (group 16SrI) affecting papaya in Cuba

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Papaya (*Carica papaya*) is an important fruit crop in eastern Cuba due to its local consumption and export value. Recently, a phytoplasma belonging to group 16SrII, '*Candidatus* Phytoplasma aurantifolia', has been confirmed as the cause of bunchy top symptom (BTS) of papaya, and the phytoplasma is vectored by *Empoasca papayae* in Cuba (Acosta *et al.*, 2010). In plantations located in eastern Cuba BTS-like symptoms, including mosaic, interveinal chlorosis, yellowing crinkling and curl apical necrosis were observed in approximately 50% of plants in each of the papaya fields that were recently surveyed in the Las Tunas, Granma, and Holguín provinces (Fig. 1). Leaf samples from 132 symptom-bearing and 30 symptomless plants were randomly collected from ten papaya fields.

Total DNA was extracted and used as template in a nested PCR with universal phytoplasma 16S rDNA primers R16mF2/R1 for the first reaction, and R16F2n/R16R2 for the nested reaction (Arocha *et al.*, 2005). PCR amplicons (~1250 bp) were obtained for 117/132 symptom-bearing samples, but not from the symptomless plants. Ten representative amplicons were purified (Wizard SV Gel and PCR Clean-Up System, Promega, Madison, WI, USA), cloned (pGEMT-Easy Vector, Promega), and sequenced bidirectionally in an ABI PRISM 377 sequencer using the Dye cycle sequencing kit (Applied Biosystems, Foster City, CA, USA).

Restriction profiles after digestion of PCR amplicons with *Kpn*I, *Hpa*II and *Hae*III endonucleases were all identical to those of '*Ca.* Phytoplasma asteris' (group 16SrI). The ten partial 16S rDNA sequences of the phytoplasma detected in the symptom-bearing samples shared 100% identity with each other, and shared 99% identity with that of the alfalfa stunt phytoplasma (GenBank Accession No. GU289675), a member of group 16SrI, subgroup 16SrI-B. The 16S rDNA consensus sequences of two papaya phytoplasmas were deposited in GenBank (JF781308, JF781311). '*Ca.* Phytoplasma asteris' group has been previously recorded in Cuba in sugarcane (Arocha *et al.*, 1999), basil (Arocha *et al.*, 2006) and other vegetable crops in the western region of the country (Arocha *et al.*, 2009). Phytoplasma belonging to the 16SrI group has been also identified in papaya from Mexico with similar symptoms (Rojas *et al.*, 2011), while in Cuba BTS was associated with 16SrII phytoplasma. To our knowledge, this is the first report of a 16SrI group phytoplasma affecting papaya crops in Cuba. The results have a significant impact for the papaya industry since the phytoplasmas of group 16SrI are known to possess the largest host range, including plant and insect vectors, and the most complex epidemiology worldwide.



Figure 1

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